Claim Language	Present in Kono	Kono Disclosure
31. A method for determine the location9s) of one or more cellular telephones	Yes	FIG. 1 shows a configuration of a moving body position locating apparatus
each initiating periodic signal transmissions over one of a prescribed set of reverse control channels, comprising the steps of:	Yes	"a moving body transmits position locating signals using shared channels,"
(a) receiving said reverse control channel signals at *[sic]* least three geographically separated cell sites;	Yes	"*12a-12n* are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations *3a-3n*."
...		

This Table is clearly erroneous. In this Table, Dr. Goodman first states (incorrectly, and again without explanation or support) that the position locating signals are transmitted over the reverse control channels. Dr. Goodman then recites a method <u>comprising the steps</u> of, receiving the *position locating signal* (i.e., the signal that Dr. Goodman incorrectly <u>states</u> is transmitted over the reverse control channel) using the *control channel transceivers*. This is clearly *not* what is taught in Kono.

<u>Kono fails to disclose or teach "processing said signals ... to produce frames of data comprising a prescribed number of *data bits*" and time stamp bits</u>

Kono fails to disclose or teach "processing said signals ... to produce frames of data comprising a prescribed number of *data bits*" and time stamp bits. Kono instead teaches processing of *position location signals* to produce of frames of data containing only time stamp bits.

As explained in the passage in Subsection 3.3.1.1 entitled "Kono fails to teach reception and provision of *reverse control channel* cellular telephone baseband signals," the position location signals are not reverse control channel signals.

As explained in the passages in Subsection 3.3.1.1 entitled "Kono fails to disclose or teach a sampling subsystem ... for sampling said baseband signal" and "Kono fails to disclose or teach "formatting the sample signal into frames of digital data", Kono fails to process the position location signals to produce a prescribed number of data bits.

Dr. Goodman's only opinion of this Claim element is stated row 5 of his Table starting on page 18, repeated below.

Claim Language	Present in Kono	Kono Disclosure
...		
(b) processing said signals at each cell site to produce frames of data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said frames were produced at each cell site;	Yes	Kono teaches software and processors in hardware unit *55* that determine and format time of arrival information. Time stamp bits: "The standard clock *54* is an ultra-high precision clock, and the time measurement circuit *53* measures the absolute time of the above-mentioned trigger, and reports it to the switching station *1* from the control circuit *55* via the control device *11a-11n*. Data bits: "It should be noted that the junction points *22a-22n* are used for voice communication signals, and the junction points *23a-23n* are used for data or control signals."
...		

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Dr. Goodman acknowledges that Kono teaches only determination of time of arrival, not time *difference* of arrival. As I state above, this does not expressly or inherently teach position location based on time *difference* of arrival.

The remainder of this Table row is also erroneous. Dr. Goodman states that the *next* step after receiving the *position locating signal* using the *control channel transceiver* (clearly untrue, as noted above), is to process *that* signal using the hardware unit 55 (control circuit) that is *clearly shown to be part of the common channel receiver* in Figure 2 of Kono, i.e., devices *16a-16n*, *not* devices *12a-12n*. Dr. Goodman *then* states that the *data bits* formed by this processing operation are taken from the *voice communication signals* transmitted over the *traffic channel transceivers 14a-14n*, or the control channel transceivers *12a-12n*. Unlike contradictory conclusions that Dr. Goodman arrives at in his summary opinion of the other Claims, I cannot attribute this to an error on his part.

The only potential explanation that I can divine for what Dr. Goodman is attempting to do here, is that he is equating the control device *11a-11n* in Figure 1 of Kono with a digital multiplexer that *combines* data bits from the control and voice channels with time stamp bits from the common channel receiver (this would explain why he referred to the *junction points* connecting these channels to the control device, rather than the transceivers themselves). However, Kono does not expressly teach that this device performs any multiplexing, and the time stamp bits do not need to be combined with bits from the voice or control channels in order to implement the position location function, hence this is not inherent to the method as well. Moreover, if the time stamp bits *were* combined with voice and control data in some kind of data frame, that frame would *not* have a prescribed (predetermined) number of bits, and the time stamp bits would *not* represent the time at which that frame was produced.

Kono fails to disclose or teach identification of cellular telephones on the basis of *differences* in times of arrival among cell sites

As explained in the passage in Subsection 3.3.1.1 entitled "Kono fails to disclose or teach means for processing said data frames from cell site systems, to generate a table," Kono fails to teach a method for processing data frames to identify individual cellular telephone signals, or the differences in times of arrival of those signals among said cell sites.

Dr. Goodman provides the following relationship between this Claim element and Kono. Once again, this relationship is erroneous. As Dr. Goodman clearly states in the prior row of this table, Kono determines the *time of arrival* of the position locating signal *at the base station*. This is the only timing information that *can be* reported to the control device *11a-11n*, as the control devices are connected to the *switching station* (exchange office) *1*, and Kono teaches no intercommunication between base stations.

Claim Language	Present in Kono	Kono Disclosure
...		
(c) processing said frames of data to identify individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell sites;	Yes	"reports to the switching station *1* via the control devices *11a-11n* data such as the difference in arrival time of position locating signals with respect to the various base stations *3a-3n*."
...		

Kono fails to disclose or teach determining, on the basis of times of arrival differences, the locations of the cellular telephones

As explained in the passage in Subsection 3.3.1.1 entitled "Kono fails to disclose or teach *any* means for determining the locations of cellular telephones," Kono fails to teach a method for determining, on the basis of times of arrival differences, the locations of the cellular telephones, under either Andrew's or TruePosition's Claim Constructions.

Dr. Goodman completely fails to provide any explanation about *how* Kono's alleged teachings are related to Andrew's (or TruePosition's) proposed Claim Constructions for this limitation of Claim 22.

3.3.1.5 Detailed Opinions Relating To Kono And Claim 32 Of The 144 Patent

A summary of my conclusions regarding the teachings of Kono to one having ordinary skill in the art at the time and the limitations in Claim 32 of the 144 Patent is set forth in Table 3-5 above. My opinions supporting these conclusions are explained in the passage in Subsection 3.3.1.1 entitled "Kono fails to disclose or teach *any* database means for storing location data."

3.3.2 Opinions Relating To Kono's Failure To Enable

In my expert opinion, Kono is not enabling because its disclosure would not allow a person of ordinary skill in the art at the time the 144 Patent was filed to make and use the inventions in the asserted claims of the 144 Patent without undue experimentation, and with a reasonable expectation of having the systems and methods work. It also is my expert opinion that a person having ordinary skill in the art at the time the 144 Patent was filed could not make and use the system disclosed and described in Kono without undue experimentation, and with a reasonable expectation of having the system work.

The system taught in Kono has numerous misstatements, omissions, errors, and other deficiencies that would prevent a person of ordinary skill in the art at the time from performing true geolocation of mobile units from data collected at only three cell sites using the method taught in Kono, without undue experimentation and refinement. In the section summarizing the means used to implement the invention (TruePosition Kono Translation, pg. TPI067420, "Means Used to Resolve Problems"), Kono teaches (highlighting mine):

> "The mobile wireless communications apparatus according to the present invention employs a plurality of base transceiver stations having common channel receiver means ..." (TruePosition Kono Translation, pg. TPI0670420, Col. 2, ll 25-27)

The term "plurality of base transceiver stations" is similarly used in the *Scope of the Patent Claim* (TruePosition Kono Translation, pg. TPI067419, Col. 1, ll 5-6, 18), and the *Area of Utility to the Industry* (TruePosition Kono Translation, pg. TPI067419, Col. 2, line 5).

The word "plurality" has several different customary and ordinary usages; the most applicable definition of "plurality" in Webster's New World dictionary, for example, is "being plural or numerous." The closest Kono comes to providing any indication of the number of base transceiver stations it would need to locate the mobile units is in its description of the first mode of operation for the first embodiment of its invention (TruePosition Kono Translation, Figure 2), in which Kono teaches (highlighting mine):

> "... when there is an adequately high number and density of common channel transceivers *[sic] 16a-16n* it is possible to obtain sufficiently high precision in the position location." (TruePosition Kono Translation, pg. TPI067421, Col. 2, ll 10-13)

That is, Kono appears to express an opinion (shared by myself) that "numerous" base transceiver stations would be required to locate the mobile units using the method taught in Kono. This opinion is supported by Kono's number system for equipment in all of its Figures, including the Prior Art (Figure 4), which uses the letter "*n*" (14th letter in the English alphabet) to denote the number of base transceiver stations employed in the invention (Figure 1) as well as the Prior Art (Figure 4). This is clearly meant to convey the sense of "numerous" base transceiver stations.

Dr. Goodman concurs with this opinion. On page 13, ll 7-9 of his report, he states (highlighting mine):

> ... the Kono patent refers to *n* base stations (labeled *3a* to *3n* in Figures 1, 3, and 4, each containing a shared *[common]* channel receiver (*16a-16n*)."

That is, Dr. Goodman agrees that the Kono is teaching *numerous* base stations.

Kono provides no additional information on the number of base transceiver stations required for geolocation of the mobiles, nor does it provide any information on methods, algorithms, or means for using "times at which position location signals arrived" to locate the position of the mobile unit that transmitted that position location signal. Moreover, Kono provides no methods, algorithms, or even references to literature on means for transforming "absolute or relative time at which the position location signal arrived [at the base transceiver station] into mobile geolocation. And it provides *no* useful information on the number of base transceiver stations required for *adequate* geolocation of the mobiles.

Later in the description of the first embodiment, Kono teaches (highlighting mine):

> "... at detector/decoder *51* it *[the baseband position location signal]* is decoded into a position location signal *[sic]*. The position location signal contains a unique word of about 14 bits, and at the unique word detector circuit *52*, the difference between it and the original unique word is detected, and at the point in time when the correlation peaks, the time measurement circuit *53* is triggered. The standard clock *54* is an ultra high precision clock, and the time measurement clock measures the absolute time of the foregoing triggering, and a report is issued from the control circuitry *55* to the exchange office *1* via the control device *11*. Also, conversely time corrections to the standard clock are made by the exchange office *1* and since the correlation detection of the unique work has a precision on the order of 1/50 of a bit, the precision is (1 sec ÷ 50 kbps) × 1/50 ≈ 0.4 μs. This means the mobile unit *5* can be lo-

cated to within about 120 meters. With a bit rate of approximately 500 kbps, the location precision can be improved to about 12 meters." (TruePosition Kono Translation, pg. TPI067422, Col. 1, line 42-51, Col. 2, ll 1-10)

This passage, which contains the *only* criteria for geolocation accuracy taught by Kono, contains numerous misstatements and outright errors, and relies on information that is not taught in the patent application.

~~For example, insufficient and/or erroneous information is provided to justify Kono's assertion that "the correlation detection of~~ the [14 bit] unique work has a precision on the order of 1/50 of a bit." In fact, correlation precision is a function of the time-bandwidth product (TBP) of the unique word (duration × bandwidth of the component of the position location signal containing the unique word), the signal-to-interference-and-noise ratio (SINR) of the signal received at the common channel receiver, and (if the decoded component of the position location signal containing the unique word is used in the correlator) the processing gain of the common channel "detector/decoder *51*" discussed (but not shown in Figure 2). Neither the TBP of the unique word, nor the SINR of the signal received at the common channel receiver, nor the processing gain of the detector/decoder *51* is provided anywhere in Kono.

In addition, if the position location signal is *decoded* <u>before</u> the correlation operation, this bit precision is more likely to be on the order of the *symbol* period of the modulated signal, e.g., the bit period if the position location signal is BPSK modulated. If a more complex signal modulation is used, e.g., a QPSK modulation, both the symbol precision and the correlator TBP would be reduced by the number of bits/symbol, e.g., by a factor of 2 for a QPSK modulation (2 bits/symbol).

Since no information is provided about the modulation format of the position location signal, it not possible to determine the true precision of the correlation operation. However, if a "reasonable" assumption that the position location signal is BPSK is made, then the precision of the common channel receiver is likely to be closer to 1 bit than 1/50 bit, e.g., if the "correlation" detection operation taught (but never explicitly described) in Kono is performed using a 1-bit multiply-and-count operation. More complex processing, e.g., using sampling rather than decoding operations, or using combinations of bit correlation and timing *phase* measurement operations, could be devised to improve this precision; however, this processing would necessarily require additional non-inherent processing not expressly described in Kono.

Moreover, the subsequent analysis provided after this 1/50 precision assertion provides no explanation or support for the term "1 sec" or "50 kbps," and fails a simple dimensionality test, since 1 sec ÷ 50,000 bit/sec × 1/50 bit = 0.4 μs-sec, not 0.4 μs. Lastly, Kono's assertion that 0.4 μs at one of the common channel receiver "means that the mobile unit can be located to within about 120 meters" is again untrue and/or relies on information that is not provided. In fact, the 0.4 μs accuracy figure can*not* be translated to a range accuracy, unless either (a) means are provided at the mobile to precisely control the *transmission time* of the position location signal (so that the true time-of-flight of the signal can be determined), or (b) at least three time-of-arrival measurements have been taken. Moreover, it is unlikely that every time-of-arrival measurement will have the same accuracy, since the signals will be receivd with highly variable SINR's at each base transceiver station (and usually much *lower* SINR's at outlying base transceiver stations) under most realistic use scenarios.

Lastly, the assertion that "raising the bit rate to 500 kbps" would reduce this error by a factor of 10 is grossly incorrect. If all other factors are unchanged, and in particular if the number of bits in the unique word is kept the same, *increasing* the bit rate (unique word bandiwidth) by a factor of ten will *decrease* the unique word *duration* by a factor of ten, resulting in *no change* in the time-bandwidth product. Moreover, a *factor-of-100* increase in TBP would be required to drop the location accuracy by a factor of 10, that is, the unique word length *and* bit rate would need to be increased to 1,400 bits and 5,000 kbps, respectively, in order to reduce the location accuracy from 120 meters to 12 meters!

It is instructive to note that the 144 Patent taught the collection of frames of data contains 60,000 bits of sampled baseband data/frame (144 Patent, Col 11, line 61), rather than the 14 bit Unique Word taught in Kono. All other factors being equal, this is equivalent to a *factor-of-4,000* increase in time-bandwidth product over Kono, or a factor-of-20 improvement in geolocation accuracy. It is absolutely clear to me that that anyone of ordinary skill in the art at the time would face a difficult regimen of experimentation to truly reduce the Kono invention on practice, based on the information provided in that patent application.

Given all of these factors, a person of ordinary skill in the art would need to perform a great deal of experimentation and analysis to refine the first embodiment to a form that would allow adequate geolocation of the mobile units using at least three cell sites. That person would need to determine the likely receive power and pathloss needed to receive the position location signals at an SINR allowing such geolocation. That person would need to modify the system front end (antennas, cables, receiver LNA's, etc.) such as those taught in Col. 9-10 of the 144 Patent, to overcome deficiencies revealed by this determination, for example, using a different antenna than those used for the cellular network. That person would need to adjust the length of the unique word to provide adequate time-bandwidth product for adequate time-of-arrival estimation at the receivers,

especially the outlying receivers in the network. That person would need to measure and remove site biases in the receiver cables and hardware, as is taught in Col. 12, ll 9-13 of the 144 Patent. Taken together, these refinements violate the undue experimentation requirement for the first embodiment of the Kono system to be enabling.

3.3.3 Opinions Relating To Kono Being No More Pertinent Than the Prior Art Considered During Examination of the 144 Patent

In my expert opinion, the prior art considered during the examination of the 144 patent teaches the same material disclosed in Kono, in much greater detail than Kono, and is therefore just as pertinent to the 144 patent as Kono, if not more pertinent. In particular, three of the patents considered during the 144 Patent prosecution, and one of the patents cited by the U.S. Patent Office in its Office Action during this Prosecution (the 618 Patent), teach every element of the subject matter disclosed in Kono.

A listing of Prior Art that teaches key elements of the system taught by Kono is provided in Table 3-6 below. In each case, I have considered whether the prior art teaches the following elements of Kono:

- collection of mobile signals by a multipoint collection network joined by a central node, e.g., a cellular telephone network;
- transmission of a "unique signal" from the network (either a signal unique to the transmission channel, the location function, or the mobile unit);
- transmission of that signal over a "common" or "shared" reverse transmission channel; and
- geolocation of remotes using a "time based" method — one that either measures the time-of-arrival of a signal at each collector (the mode taught in Kono), or that measures time-of-flight to each collector.

As this Table shows, each key element of Kono is taught by several of these prior art references. And, three of the prior art references, including the 618 patent cited by the Examiner, teaches *every* key element of Kono.

Table 3-6: Prior Art Examined By the USPTO During the 144 Patent Prosecution that is as Pertinent as Kono

Prior Art	***Reference***	***Multipoint collect network***	***Unique location signal***	***Common/ shared channel***	**Time-based geo**
R. Fuller, R. Kaye, J. Oliver, W. Reed, "Surface Vehicle Fleet Command and Control System," U.S. Patent No. 3,646,580	*580 Patent*	✓	✓		✓
J. Wanks, "Remote Controlled Tracking Transmitter and Tracking Support System," U.S. Patent No. 4,596,988	*988 Patent*	✓	✓		
W. Sagey, H. Lind, C. Lind, "Vehicle Location System," U.S. Patent No. 4,740,792	*792 Patent*	✓	✓	✓	✓
E. Rackley, "Stolen Object Location System," U.S. Patent No. 4,472,357	*357 Patent*	✓	✓		
S. Apsell, N. Stapelfeld, "Method of and System and Apparatus for Locating and/or Tracking Stolen or Missing Vehicles and the Like," U.S. Patent No. 4,818,998	*998 Patent*	✓	✓	✓	
E. Sheffer, "Vehicle Location System," U.S. Patent No. 4,891,650	*650 Patent*	✓			✓
D. Gray, H. Gendler, "Stolen Vehicle Recovery System," U.S. Patent Number 5,003,317	*317 Patent*	✓	✓		
W. Sagey, "Cellular Telephone Service Using Spread Spectrum Transmission," U.S. Patent No. 5,218,618	*618 Patent*	✓	✓	✓	✓
G. Russell, J. Chadwick, J. Bricker, "Vehicle Location System Having Enhanced Position Location Processing," U.S. Patent No. 5,166,694	*694 Patent*	✓	✓	✓	✓

3.3.4 Other Matters Germane to my Opinion

3.3.4.1 Opinions Relating to the Andrew Claims Constructions

In my expert opinion, numerous Claims Constructions proposed by Andrew are either incorrect, or possess substantive ambiguities that prevent me from applying them to Kono or the 144 Patent. A list of disagreements/ambiguities germane to this report, and of interpretations that I am using to evaluate ability of Kono to anticipate or invalidate the 144 patent in Section 3.3.1, listed in Table 3-7 below.

Table 3-7: Disagreements and Interpretations of Ambiguities in the Andrew Claim Constructions

Claim Term	Andrew Proposed Construction	Dr. Agee Disagreement/Ambiguity, and Interpretation for purposes of this Report
Control channels	An analog channel	**Disagreement**: The ordinary and customary meaning of "control channels" is not limited to "analog" channels, especially as it is argued by Dr. Goodman. See Subsection 3.3.4.3 below for more discussion on this topic. **Ambiguity**: the term "analog channel" is not defined here. Control channels are typically logical entities, defined at the data link layer. However, there is precedence for "physical" and "logical" control channels in various standards documents, e.g., the RCR-28 standard, to differentiate the control data carried over the channel from the physical layer entity (frequency channel, time slot, etc.) used to transport that data. **Interpretation**: "analog channel" is interpreted in this report to be a physical layer entity carrying control data, e.g., a frequency channel set aside for transmission of control data in cellular telephone networks conforming to the AMPS standard.
	that is	
	simultaneously shared by multiple cellular telephones	**Ambiguity**: "Simultaneously" ordinarily and customarily implies time-coincidence. "Shared" is not defined. "Simultaneously shared" could imply "simultaneously utilized" (multiple telephones transmit data on the channel at the same time) or "simultaneously allocated" (multiple telephones are assigned the same frequency channel, which they are allowed to use if that channel is free). Control channels are accessed serially to transmit user-specific control data to and from individual cellular telephones. **Interpretation**: "Simultaneously shared" is interpreted in this report to be a channel that is simultaneously allocated to, but not simultaneously utilized by, multiple telephones.
	and that carries and communicates only	
	signaling information	**Ambiguity**: "Signaling information" is not defined here, nor could I find a specific definition of this term within my textbooks describing the AMPS cellular telephone standard. **Interpretation**: Infer this term from the definition of *signaling* provided in *Telecommunications: Glossary of Telecommunication Terms* ("FS-1037C"), published 23 August 1996, **signaling: 1.** The use of signals for controlling communications. **2.** In a telecommunications network, the information exchange concerning the establishment and control of a connection and the management of the network, in contrast to user information transfer. **3.** The sending of a signal from the transmitting end of

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		a circuit to inform a user at the receiving end that a message is to be sent. *[citations omitted]* Using this definition, signaling information is interpreted here as control information that is provided by the telecommunications network, to set up and manage the network, inform user receiver that a message is to be sent, or otherwise control communications of the network.
Time stamp bit	Time stamp representing the exact time the frame of data was created.	**Disagreement:** The ordinary and customary meaning of this phrase does not include any time of creation limitation; it is simply information indicating a point or points in time that is or are relevant to a particular application. In the case of the 144 Patent, the claim language immediately following this phrase expressly addresses what point in time the time stamp bits represent. Thus, there is no need to add a time of creation limitation to this phrase, and doing so renders the claim redundant and confusing. **Ambiguity**: The term "created" is not defined. In particular, since the "frame of data" referred to here contains both data bits and time stamp bits, the "exact time the frame of data was created" could be anywhere from when the data bits within the "frame of data" were created by sampling the received cellular telephone signal, to when the time stamp bits were combined with those data bits to create the final frame of data. **Interpretation:** The "exact time the 'frame of data' was created" is interpreted here to be the exact time that the received cellular telephone signal was sampled to create the data bits contained within the "frame of data."
Initiating	Causing or bringing about	**Disagreement:** In ordinary and customary usage, "initiating" implies "beginning" an activity, i.e., without *necessary* prompting from an external party, or *necessarily* as a cause of an earlier event. Both "causing" and "bringing about" lack this nuance under many definitions. Moreover, in my expert opinion, there is no special technical meaning for "initiating," "causing," or "bringing about" that a person of ordinary skill in the art might be familiar with; in particular, none of these terms are defined in FS-1037C, and the term "initiating" is never specifically defined in the 144 patent. I see no justification for replacing a word that employed with its ordinary and customary usage in the 144 patent, with another word or phrase that has ordinary and customary usages that may be potentially different in some contexts. **Ambiguity:** Both "causing" and "bringing about" have differing ordinary and common usages in differing contexts.
Timing signal	Signal that is provided to all cell sites to generate a time stamp for each frame of data.	**Disagreement:** In the 144 Patent claims each cell site possesses a timing signal *receiver*, which provides time stamp bits representing the time at which cellular telephone signals are received. In the preferred embodiment of the 144 patent, and in Claim 2 of the 144 patent, the timing signal receiver is a GPS receiver, which processes *multiple* GPS emissions (signals generated external to the cellular telephone network, from multiple global positioning system satellites) to generate time stamp bits *independently* at each base station.

3.3.4.2 Identified Deficiencies in the Andrew Kono Translation

In my consideration of the Andrew Kono Translation, I encountered a number of differences between the Andrew and True-Position translation. A partial list of these differences is summarized as follows.

- Failure to provide translations of the Figures. This, of course, was the key factor in my decision to principally rely on ~~the TruePosition translation rather than the Andrew translation in my formulation of this report.~~
- Use of term "shared" (Andrew) versus "common" (TruePosition) channels for transmission on position location signals
- Use of term "Solving" (Andrew) versus "Resolved" (TruePosition).
- Use of term "shared channels allotted jointly to the base station" (Andrew) versus "commonly allocated common channel" (TruePosition). Note, the TruePosition interpretation sounds much more like a description of an air interface.
- A key sentence in Kono reads:

  > "The mobile equipment *5* stands by to receive the signal with strongest electrical field from among the radiated position locating call signals radiated by the base station *3a*, using the control channel, and when this position location call signal is received, it immediately transmits a response signal, switching to a shared channel and emitting a position locating signal which is a burst digital signal."

  in Andrew's translation, and reads:

  > "From among the calls for position location for the mobile unit *5*, while standing by on the control channel having the strongest electrical field, which is that from base transceiver station *3a*, it immediately transmits a response and switches to the common channel and transmits a position location signal in the form of a digital burst signal."

  in TruePosition's translation. The TruePosition translation implies that *two* responses are sent from the mobile: a response to the base station's request for a position location signal, followed by the position location signal itself. I interpreted this first response to be an acknowledgement of the request, which is typically performed on a reverse link control channel, which underscored the point that the system *has* a reverse link control channel that is *not* the common channel used for transmission of the position location signals. In contrast, Andrew's translation implies that a *single* signal is sent: the position location signal.

3.3.4.3 Other Disagreements with the 144 Patent Invalidity Report

I disagree with the following additional assertions in Dr. Goodman's 144 Patent Invalidity Expert Report, in addition to those disagreements provided in the previous Sections.

Goodman characterizes AMPS, IS-54, and IS-95 as familiar to persons skilled in the art in 1993. I disagree with this assertion, based on my definition of one skilled in the art in 1993. I would instead say that information on these signals was available in 1993, and could be accessed and learned by persons of ordinary skill in the art.

Discussion of the meaning of "analog control channels" is completely irrelevant. The 144 patent clearly and obviously teaches means for exploiting both analog and digital control channels, specifically refers to digital 10 kbps Manchester encoded channels (used in AMPS reverse control channels, as Goodman shows in Figure 3.10, pg. 9 of his own report), and devotes an entire section (Section 2, column 14, line 45, through column 16, line 2, and Figure 7A) to exploitation of digital reverse control channels. Moreover, the preferred embodiment taught in Figure 6 would work with analog or digital signals. Lastly, the Claims do not refer to digital or analog nature of reverse link control channels

22 December 2006
Dated

Brian G. Agee, Ph.D., P.E.

EXHIBIT A

Curriculum Vitae of Brian G. Agee, Ph.D., P.E.

EXPERIENCE

2003-Present Founder and President, B³ Advanced Communication Systems
Since April 2003, Brian Agee has been using B³ Advanced Communication Systems to perform engineering services and independent research and development activities for commercial and U.S. government applications and clients. Projects performed in this capacity include:

- development of systems engineering tools for design, analysis, and visualization of collaborative communication and reconnaissance networks;
- development of robust emitter detection and geolocation methods for collaborative reconnaissance networks;
- development of techniques and systems for detection, demodulation, and geolocation of WLAN devices; and
- development, analysis, and simulation of transceivers for secure, adaptive MIMO mesh networks.
- systems and techniques for robust, energy-efficient spatially-adaptive transceivers and networks.

Dr. Agee is also providing expert analysis for the venture capital and legal communities through this company.

2003-Present Adjunct (Full) Research Professor, Virginia Tech
Since November 2003, Dr. Agee has hald a position as an Adjunct Research Professor with Virginia Techs Mobile and Portable Radio Group (MPRG). In this capacity, he is participating as an advisor to Ph.D. candidates, and has initiated and is currently executing research into mehods for detection, classification, geolocation, and management of interference using conventional and cooperative 802.11 radio networks.

2001-2004 Co-Founder and Chief Technical Officer, Protean Radio Networks
In May 2001, Brian Agee co-founded Protean Radio Networks, a developer of spatially adaptive transceivers and mesh networking technology for wireless communication systems and networks. While at Protean, Dr. Agee developed 802.11-compatible technology for physical layer network self-optimization, MIMO mesh networking, and intruder detection/excision, and its 802.11-compliant technology for detection, identification, and separation/excision of DSS and OFDM signals in dense interference. Dr. Agee also led development, systems engineering, analysis, and demonstration of a hardware prototype of the 802.11-compatible system. Dr. Agee currently owns all of the intellectual property developed by the company, including issued and pending patents for mesh networking and secure communication using networks of spatially adaptive transceivers.

1999-2001 Consulting Engineer
From April 1999 until May 2001, Dr. Agee was self-employed as a professional consulting engineer, and engaged in independent research and development (IRAD) activities. Projects performed during this period include an analysis of spectral utilization and coexistence issues between unlicensed and LMS-licensed users in the 902-928 MHz frequency band; design of a high-rate OFDM-based subscriber/backhaul system concept for the Ricochet Packet Data Network; design of a DAB-based communication/paging system; and systems engineering, technical analysis, and design of PCS overlay communications and multimission SIGINT/communications processing for the Adaptive Joint C4SI Node (AJCN) system. IRAD

1990-1999 Director, Advanced Concepts/Engineering Studies, Radix Technologies, Inc.
Brian Agee was associated with Radix Technologies from before its incorporation in December 1990 until April 1999. At the inception of Radix, Dr. Agee participated in developing the founders initial business plan, led the companys algorithm development efforts beginning in November 1990, and brought in its first contract and revenue in Q2 1991. He joined the company as a full-time employee in March 1991, with technical and management responsibility over system analyses, signal processing concepts, and algorithm development activities. During this period, Dr. Agee invented or directed invention of core system concepts and advanced DSP techniques for all of Radix's commercial telecommunications projects, and for all of Radix's major signal reconnaissance projects. Telecommunications technology developed during this period include the end-to-end system concept, adaptive network access techniques, and reciprocal, spread spectrum adaptive traffic reception/transmission concept and algorithms for a very high capacity (≥ 18 bps/Hz using 1996 device technology) commercial wireless local loop (AT&T *Angel*); high-speed, high-capacity packet-radio extensions of the *Angel* technology for WMAN applications (later developed into the BeamPlex product by Beamreach Networks, a commercial spinout of Radix Technologies); and the *Geophone* system for infrastructure-based geolocation of IS-95A CDMA handsets. Signal reconnaissance technology developed during this period includes the core blind adaptive signal detection, copy, and direction-finding algorithms for a cross-service, multi-

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platform signal reconnaissance system (Joint Airborne SIGINT Architecture); products for cellular location and broadband packet data services; and techniques for airborne and terrestrial detection, copy, and geolocation of structured waveforms in severe interference and multipath environments.

1984-1991 Consulting Engineer, dba *AGI Engineering Consulting*

Dr. Agee performed engineering services from 1984 to 1989, concurrent with his Doctoral research at the University of California, Davis, CA. Techniques and algorithms developed during this time period include the *multitarget constant modulus algorithm (MT-CMA)* for detection and separation of FM, PSK, and FSK communication signals; the *Dominant Mode Prediction (DMP)* algorithm for detection, and copy of burst and agile communication signals; the *self-coherence restoral (SCORE)* method for detection and copy of bauded communication signals; the *adaptive demodulation* approach for blind recovery and separation of bauded PAM and FSK (M-PAM), and blind despreading of DSSS baseband symbol sequences; the *copy-aided direction-finding* approach for optimal localization of structured signals; and the *multiplatform SCORE* algorithm for blind detection, separation, and copy of spatially coherent structured or unstructured co-channel emissions using uncalibrated multisensor antenna arrays, based on the differing time-difference-of-arrival (TDOA) and/or frequency-difference-of-arrival (FDOA) of those emitters.

1979-1984 Member of Technical Staff, ARGOSystems, Inc.

Dr. Agee performed numerous algorithm development and analysis studies while employed at ARGOSystems from 1979 to 1984, including co-development of the *constant modulus algorithm (CMA)* for copy of PSK and QAM communication signals, and the FFT-accumulation method for cyclic spectral analysis of cyclostationary signals.

1977-1979 Research Assistant/Associate, University of California, Davis

Dr. Agee developed pilot-aided/multistage adaptation algorithms for signal reception and noise cancellation.

EDUCATION

Doctor of Philosophy, Electrical Engineering, University of California, Davis CA, June 1989.
Dissertation: *The Property Restoral Approach to Blind Adaptive Signal Extraction*

Master of Science, Electrical Engineering, University of California, Davis CA, March 1985.
Thesis: *Multichannel Adaptive Signal Extraction Using Embedded Pilot Signals*

Bachelor of Science (High Honors), Electrical Engineering, University of California, Davis, June 1977

Bachelor of Science (Honors), Mathematics, University of California, Davis, June 1977

PROFESSIONAL

Licensed Professional Electrical Engineer, State of California (License No. E012727)
Senior Member, Institute of Electrical and Electronic Engineers (Member No. 07249956SM)
Technical Chair, Thirty-Fourth Asilomar Conference on Signals, Systems, and Computers

PATENTS AND PUBLICATIONS

Inventor or co-inventor on 8 issued and pending U.S. patents.
Author or co-author on over 100 technical reports, conference papers/presentations, and journal publications.

EXHIBIT B

Patents and publications of Brian G. Agee, Ph.D., P.E.

PATENT APPLICATIONS PUBLISHED SINCE 1988

B. Agee, M. Bromberg, "Method and Apparatus for Optimization of Wireless Multipoint Electromagnetic Communication Networks," U.S. Patent Application Number 09/878,789, filed June 10, 2001 (June 2000 priority date)

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B. Agee, M. Bromberg, D. Gerlach, M. Ho, M. Jesse, R. Mechaley, D. Stephenson, T. Golden, D. Nix, R. Naish, D. Gibbons, R. Maxwell, E. Hoole, D. Ryan, "Priority Messaging Method for a Discrete Multitone Spread Spectrum Communications System," U.S. Patent Number 6,621,851, issued September 16, 2003

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B. Agee, M. Bromberg, D. Gerlach, M. Ho, M. Jesse, R. Mechaley, D. Stephenson, T. Golden, D. Nix, R. Naish, D. Gibbons, R. Maxwell, E. Hoole, D. Ryan, "Highly Bandwidth-Efficient Communications," U.S. Patent Number 6,359,923, issued March 19, 2002

B. Agee, "Stacked Carrier Discrete Multiple Tone Communication Technology and Combinations with Code Nulling, Interference Cancellation, Retrodirective Communication, and Adaptive Antenna Arrays," U.S. Patent Number 6,128,276, issued October 3, 2000

W. Gardner, S. Schell, B. Agee, "Self-Coherence Restoring Signal Extraction and Estimation of Signal Direction of Arrival," U.S. Patent Number 5,299,148, issued March 29, 1994

W. Gardner, B. Agee, "Self-Coherence Restoring Signal Extraction Apparatus and Method," U.S. Patent Number 5,225,210, issued October 19, 1993

JOURNAL AND BOOK PUBLICATIONS PUBLISHED SINCE 1988

M. Bromberg, B. Agee, "Optimization of Spatially Adaptive Reciprocal Multinode Communication Networks," *IEEE Trans. Comm.*, August 2003

B. Agee, "Exploitation of Internode MIMO Channel Diversity in Spatially Distributed Multipoint Networks," in *Wireless Personal Communications: Bluetooth Tutorial and Other Technologies*, Chapter 11, ed. W. Tranter, B. Woerner, J. Reed, T. Rappaport, Kluwer Academic Publishers, December 2000

B. Agee, R. Kleinman, J. Reed, "Soft Synchronization of Direct Sequence Spread Spectrum Signals," *IEEE Trans. Comm.*, vol. COM-44, no. 11, pp. 1527-1536, November 1996

B. Agee, "Solving the Near-Far Problem: Exploitation of Spatial and Spectral Diversity in Wireless Personal Communication Networks," in *Wireless Personal Communications: Trends and Challenges*, ed. T. Rappaport, B. Woerner, J. Reed, Kluwer Academic Publishers, 1994, pp. 69-80.

R. Mendoza, J. Reed, T. Hsia, B. Agee, "Interference Rejection Using Time-Dependent Constant Modulus Algorithms and a Hybrid CMA/SCD," *IEEE Trans. ASSP*, July 1991

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CONFERENCE AND SEMINAR PRESENTATIONS AND PUBLICATIONS SINCE 1988

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B. Agee, "Blind Detection, Separation, and Location of Dense Co-Channel Emitters Using Multiplatform Spatial-Coherence Restoral," in *Proc. 2006 IEEE Workshop on Sensor Array and Multichannel Processing*, July 2006

Y. Zhao, B. Agee, and J. Reed, "Collaborative Synchronization for Macrodiverse Exploitation of Conventional 802.11 Enterprise Networks", 2005 MPRG Wireless Personal Communications Symposium, June 2005

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B. Agee, "Efficient Allocation of RF Transceiver Resources in Spatially Adaptable Communication Networks," in *2003 Workshop on Advances in Smart Antennas for Software Radios*, June 2003

B. Agee, M. Bromberg, "Exploitation of MIMO Network Diversity in Multipoint Communication Networks," presented at the *Thirty-Fifth Asilomar Conference Signals, Systems, and Computers*, November 2001

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B. Agee, S. Bruzzone, M. Bromberg, "Exploitation of Signal Structure in Array-Based Blind Copy and Copy-Aided DF Systems," in *Proc. 1998 Intl. Conf. on Acoustics, Speech and Signal Proc.*, May 1998

M. Bromberg, B. Agee, "Direction Finding for Unstructured Emitters in the Presence of Structured Emitters," in *Proc. 1998 Intl. Conf. on Acoustics, Speech and Signal Processing*, May 1998

E. Krzysiak, D. Branlund, B. Agee, "New Copy-Aided Techniques for Superresolution Direction Finding and Geolocation," in *Proc. Fourth Southwest Institute Conference on Direction Finding*, November 1997, San Antonio, TX

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B. Agee, C. Clark "Technical Challenges to Commercial Geolocation: A Defense Technologists Perspective," presented at the Seventh Symposium on Wireless Personal Communications, Panel on E911 Position Location, June 1997, Blacksburg VA (Invited Presentation)

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S. Bruzzone, B. Agee, "Array-Based Blind Detection and Separation of Frequency-Coincident Voice Modulated SSB," presented at the *1992 Interference Mitigation Conference (IMCON)*, March 1993, Fort Meade, MD

D. Branlund, B. Agee, R. Johnson "The *Ice Ax* System for Interference Excision and Superresolution DF," presented at the *1992 Interference Mitigation Conference (IMCON)*, March 1993, Fort Meade, MD

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B. Agee, "Convergent Behavior of Modulus-Restoring Adaptive Arrays in Gaussian Interference Environments," in *Proc. Twenty-Second Asilomar Conf. Signals, Systems and Computers*, November 1988

S. Schell, B. Agee, "Application of the SCORE Algorithm and SCORE Extensions to Sorting in the Rank-*L* Environment," in *Proc. Twenty-Second Asilomar Conf. Signals, Systems, Comp.*, Nov. 1988

B. Agee, "The Baseband Modulus Restoral Approach to Blind Adaptive Signal Demodulation," 1988 Digital Signal Processing Workshop, September 1988, Tahoe CA (Invited Paper)

B. Agee, S. Schell, W. Gardner, "The SCORE Approach to Blind Adaptive Signal Extraction: An Application of the Theory of Spectral Correlation," in *Proc. Fourth ASSP Workshop on Spectrum Estimation and Modelling*, pg. 277, August 1988, Minneapolis MN (Invited Paper)

B. Agee, S. Schell, W. Gardner, "Self-Coherence Restoral: A New Approach to Blind Adaptation of Antenna Arrays," in *Proc. Twenty-First Asilomar Conf. Signals, Systems and Comp.*, November 1987

B. Agee, "Fast Polarization Control Using the Least-Squares Constant Modulus Algorithm," in *Proc. Twentieth Asilomar Conference on Signals, Systems and Computers*, pg. 590, November 1986

B. Agee, "The Least-Squares CMA: A New Approach to Rapid Correction of Constant Modulus Signals," in *Proc. 1986 International Conf. on Acoustics, Speech and Signal Processing*, vol. 2, pg. 19.2.1, April 1986, Tokyo, Japan

EXHIBIT C

Materials Considered by Brian G. Agee, Ph.D., P.E.

No	Description	Date	*Reference*
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[3]	R. Anderson, M. Merigo, "Mobile Locator System for Metropolitan Areas," U.S. Patent No. 3,680,121	Filed 2 January 1970	*121 Patent*
[4]	W. Reagan, "Auto Theft Detection System," U.S. Patent No. 4,177,466	Filed 16 November 1977	*466 Patent*
[5]	L. Henriques, "Rangefinder Using Expanded Time Delay," U.S. Patent No. 4,297,701	Filed 8 August 1979	*701 Patent*
[6]	D. Wind, "Locating Device," U.S. Patent No. 4,433,335	Filed 16 May 1978	*335 Patent*
[7]	G. Huensch, R. Lien, J. Lind, V. MacDonald, "High Density Cellular Mobile Radio Communications, U.S. Patent No. 4,475,010	Filed 5 May 1983	*010 Patent*
[8]	J. Wanks, "Remote Controlled Tracking Transmitter and Tracking Support System," U.S. Patent No. 4,596,988	Filed 19 June 1983	*988 Patent*
[9]	*Webster's New World Dictionary of the American Language*, ed. D. Guralink, Warner Books	1984	*Webster I*
[10]	N. King, I. Pawson, M. Baker, R. Shaddock, E. Stansfield, "Direction Finding," U.S. Patent No. 4,639,733	Filed 11 May 1984	*733 Patent*
[11]	E. Drogin, "Unambiguous Wide Baseline Interferometer," U.S. Patent No. 4,638,321	Filed 1 June 1984	*321 Patent*
[12]	L. Martinez, "Integrated Radio Location and Communication System," U.S. Patent No. 4,651,156	Filed 28 February 1985	*156 Patent*
[13]	D. Gray, R. Gendler, J. Carrett, "Security Monitoring and Tracking System," U.S. Patent No. 4,651,157	Filed 7 May 1985	*157 Patent*
[14]	L. Green, J. Carrott, D. Gray, R, Gendler, "Method for Accurately Displaying Positional Information on a Map," U.S. Patent No. 4,791,572	Filed 20 November 1985	*572 Patent*
[15]	J. Maloney, "Direction Finding Localization System," U.S. Patent No. 4,728,959	Filed 8 August 1986	*959 Patent*
[16]	W. Sagey, H. Lind, C. Lind, "Vehicle Location System," U.S. Patent No. 4,740,792	Filed 27 August 1986	*792 Patent*
[17]	E. Rackley, "Stolen Object Location System," U.S. Patent No. 4,472,357	Filed 17 September 1986	*357 Patent*
[18]	A. Cusdin, A. Dadds, P. Mallinson, "Radio Direction-Finding Using Time of Arrival Measurements," U.S. Patent No. 4,797,679	Filed 9 January 1987	*679 Patent*

[19]	S. Apsell, N. Stapelfeld, "Method of and System and Apparatus for Locating and/or Tracking Stolen or Missing Vehicles and the Like," U.S. Patent No. 4,818,998	Filed 31 March 1986	*998 Patent*
[20]	C. Counselman, "Method and Apparatus for Determining Position from Signals from Satellites," U.S. Patent No. 4,870,422	Filed 11 August 1986	*422 Patent*
[21]	G. Selby, "Mobile Radio Transmission System," U.S. Patent No. 4,876,738	Filed 16 September 1987	*738 Patent*
[22]	J. Friedman, J. King, J. Pride, "Time Difference of Arrival Geolocation Method, Etc.," U.S. Patent No. 4,888,693	Filed 15 December 1987	*693 Patent*
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[24]	S. Apsell, N. Stapelfeld, "Apparatus for Locating and/or Tracking Stolen or Missing Vehicles and the Like," U.S. Patent No. 4,908,629	Filed 5 December 1988	*629 Patent*
[25]	T. DAmico, B. Johnson, "Digital Radio Communication System and Two Way Radio," U.S. Patent No. 5,127,100	Filed 27 April 1989	*100 Patent*
[26]	D. Gray, H. Gendler, "Stolen Vehicle Recovery System," U.S. Patent Number 5,003,317	Filed 11 July 1989	*317 Patent*
[27]	E. Baghdady, "Methods and Apparatus for Direction of Arrival Measurement and Radio Navigation Aids," U.S. Patent No. 4,975,710	Filed 1 August 1989	*710 Patent*
[28]	T. Cupp, "Method of Monitoring Golf Carts on a Golf Course," U.S. Patent No. 4,926,161	Filed 23 October 1989	*161 Patent*
[29]	K. Gilhousen, R. Padoval, C. Wheatley, "Method and System for Providing a Soft Handoff in Communications in a CDMA Cellular Telephone System," U.S. Patent No. 5,101,501	Filed 7 November 1989	*501 Patent*
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[35]	M. Kono, "Moving Body Radio Communication Equipment," Japanese Patent Application Kokai (Laid-Open) Publication No. H3-239091, *English Translation of Abstract performed by Lexis*	Filed February 16, 1990	*Kono Abstract Translation*
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[46]	W. Smith, "Passive Location of Mobile Cellular Telephone Terminals," in *Proc.* 1991 IEEE Intl Carnahan Conf. Security Tech., pp. 221-225	Published 1 October 1991	*Smith*
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		October 2006	*tion*
[55]	Andrew Corporations Supplemental Responses to TruePosition's Interrogatory Nos. 3 and 7	8 November 2006	*Andrew Nov 8 Supplemental Response*
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[58]	TruePosition's Cumulative Identification of Claim Terms and Proposed Constructions	11 December 2006	*TruePosition Claim Constructions*

CERTIFICATE OF SERVICE

I, Daniel J. Goettle, hereby certify that on this 22nd day of December, 2006, I served a true and correct copy of the foregoing EXPERT REPORT OF BRIAN G. AGEE, PH.D., P.E. RESPONSE TO DR. DAVID GOODMAN'S REPORT ON THE VALIDITY OF U.S. PATENT NO. 5,327,144 and its accompanying exhibits upon the following individuals in the manner indicated:

VIA ELECTRONIC MAIL

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/s/ Daniel J. Goettle
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Kessel, Amanda M. (Woodcock Washburn)

From: Rachel Pernic Waldron [rpernicwaldron@kirkland.com]

Sent: Friday, June 01, 2007 5:20 PM

To: Kessel, Amanda M. (Woodcock Washburn)

Subject: RE: TP v. Andrew: Your voicemail regarding the Agee motion

Amanda,

Thanks very much for your email. If we understand correctly, TruePosition is proposing to forgo opposing Andrew's Agee Daubert motion if Andrew agrees to the conditions set forth in your email.

If so, although we are certainly mindful of the need for judicial economy, we believe that Dr. Agee's pertinence opinion is improper and should be wholly excluded, and that there is no need for Andrew to give up any of its rights.

Please do not hesitate to let me know if you think there is anything to discuss.

Best regards,
Rachel

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06/01/2007 02:10 PM

To "Rachel Pernic Waldron" <rpernicwaldron@kirkland.com>

cc

Subject RE: TP v. Andrew: Your voicemail regarding the Agee motion

Rachel --

After evaluating the issues raised by Andrew's Daubert Motion for a Ruling Limiting the Testimony of Dr. Brian Agee, TruePosition plans to conditionally oppose this motion. TruePosition will not oppose the exclusion of Dr. Agee's "pertinence" testimony on the condition that Andrew is also precluded from introducing any evidence that the claims of the 144 patent are obvious. Rather than burden the Court with potentially unnecessary motion practice, I wanted to first discuss whether Andrew would be willing to agree to this condition. Please let me know Andrew's position and, if appropriate, I will forward a draft Stipulation and Order for your review.

Best regards -- Amanda
-----Original Message-----
From: Rachel Pernic Waldron [mailto:rpernicwaldron@kirkland.com]
Sent: Friday, June 01, 2007 12:05 PM

B101

To: Kessel, Amanda M. (Woodcock Washburn)
Subject: TP v. Andrew: Your voicemail regarding the Agee motion

Amanda,

I just wanted to let you know that I retrieved your voicemail from this morning asking to discuss the Agee Daubert motion. I am unfortunately quite tied up today; do you think you could send me an email in order to move the discussion forward?

Best regards,
Rachel

Rachel Pernic Waldron
KIRKLAND & ELLIS LLP
200 E. Randolph Drive
Chicago, IL 60601
Phone: 312.861.3371
Fax: 312.861.2200

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The information contained in this communication is confidential, may be attorney-client privileged, may constitute inside information, and is intended only for the use of the addressee. It is the property of Kirkland & Ellis LLP or Kirkland & Ellis International LLP. Unauthorized use, disclosure or copying of this communication or any part thereof is strictly prohibited and may be unlawful. If you have received this communication in error, please notify us immediately by return e-mail or by e-mail to postmaster@kirkland.com, and destroy this communication and all copies thereof, including all attachments.
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CERTIFICATE OF SERVICE

I, James D. Heisman, hereby certify that on this 4th day of June, 2007, I caused a true and correct copy of the foregoing **APPENDIX B TO TRUEPOSITION'S CONDITIONAL OPPOSITION TO ANDREW CORPORATION'S *DAUBERT* MOTION FOR A RULING LIMITING THE TESTIMONY OF DR. BRIAN AGEE** to be served upon the following individuals in the manner indicated below:

Via hand-delivery
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James D. Heisman (# 2746)